भारतीय मानक
Indian Standard

IS 9202 : 2020

रोलिंग बीयरिंग — बेलनाकार रोलर्स — विशिष्टि

(पहला पुनरीक्षण)

Rolling Bearings — Cylindrical Rollers — Specification

(First Revision)

ICS 21.100.20

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

September 2020 **Price Group 4**

Bearings Sectional Committee, PGD 13

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft was finalized by the Bearings Sectional Committee and had been approved by the Production and General Engineering Division Council.

This Indian Standard was first published in 1979 taking assistance from DIN 5402 (Part 1) : 1973 'Rolling bearings components — Cylindrical rollers'. This revision has been taken up to incorporate feedback gained through experience and other developments taken at international level in this field.

In this revision, the following changes have been made:

a) Clause on references has been modified;
b) Clause on terminology has been added;
c) Table 1 for Diameter, length and weight of rollers has been added;
d) Clause on Hardness has been modified;
e) Edge spacing, axial runout has been defined;
f) Gauge and sorting principle have been explained; and
g) Figures 1, 2 and 3 have been modified.

In the formulation of this standard assistance has been derived from DIN 5402-1 : 2014 'Rolling Bearings — Parts of rolling bearings — Cylindrical rollers' issued by the Deutsches Institut Fur Normung (DIN) and ISO 12297 : 2012 'Rolling bearings — Steel cylindrical rollers — Dimensions and tolerances'.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*).' The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ROLLING BEARINGS — CYLINDRICAL ROLLERS — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies dimensions, designations, weights, material, heat treatment, dimension accuracy and geometrical parameter for cylindrical rollers. The maximum roller diameter is 80 mm.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standard indicated below:

IS No.	*Title*
1501 (Part 1) : 2013	Metallic materials — Vickers hardness test: Part 1 Test method (*fourth revision*)
1586 (Part 1) : 2018	Metallic materials — Rockwell hardness test: Part 1 Test method (*fifth revision*)
2500 (Part 1) : 2000	Sampling procedures for inspection by attributes: Part 1 Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection (*third revision*)
3073 : 1967	Assessment of surface roughness
4398 : 1994	Carbon-Chromium steel for the manufacture of balls, rollers and bearing races — Specification (*second revision*)
IS/ISO 12297 : 2012	Rolling bearings — Steel cylindrical rollers — Dimensions and tolerances
17111 : 2019	Heat-treated steels, alloy steels and free-cutting steels — Ball and roller bearing steels

3 TERMINOLOGY

For the purpose of this standard the definitions given in IS/ISO 12297 shall apply.

4 SYMBOL

For the purpose of this standard the symbols given in IS/ISO 12297 and the following shall apply:

D_w : Nominal diameter of the cylindrical roller;

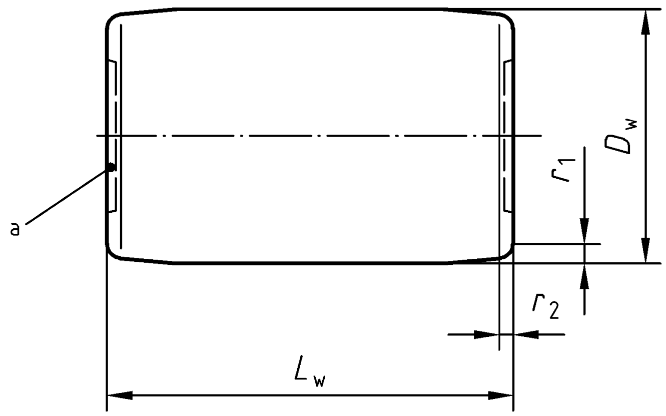
L_w : Nominal length of the cylindrical roller;

r_1 : Radial edge distance.

Radial distance between surface of the edge rounding perpendicular to roller axis and the end face of the cylindrical roller (*see also* Fig. 1).

r_2 : Axial edge distance

Axial distance between surface of the edge rounding parallel to roller axis and the end face of the cylindrical roller (*see also* Fig. 1).



[a] Exemption permitted, diameter maximum 0.6 D_w

FIG. 1 CYLINDRICAL ROLLER

5 BASIC DESIGN, DIMENSIONS, WEIGHTS

5.1 Basic Design

The basic design of cylindrical rollers is given in Fig. 1.

5.2 Roller Dimension and Weights

The dimensions and weights of the cylindrical rollers shall be as given in Table 1.

Table 1 Nominal Dimensions and Weights

(*Clause* 5.2)

D_w mm	L_w mm	Weight per 1 000 Pieces, kg
		≈
3	5	0.272
3.5	5	0.368
4	4	0.394
4	6	0.58
4	8	0.78
5	5	0.75
5	8	1.21
5	10	1.52
5.5	5.5	1
5.5	8	1.46
6	6	1.3
6	8	1.78
6	10	2.22
6	12	2.61
6.5	6.5	1.66
6.5	9	2.3
7	7	2.06
7	10	2.96
7	14	4.17
7.5	7, 5	2.54
7.5	9	3.12
7.5	11	3.74
8	8	3.08
8	12	4.65
9	9	4.4
9	10	5
9	14	6.8
10	10	6
10	11	6.8
10	14	8.5
11	11	8.1
11	12	8.9
11	15	11
12	12	10.4
12	14	12.4
12	18	15.7
13	13	13.6
13	18	18.8
13	20	20.4
14	14	16.6
14	20	23.8
15	15	20.4
15	16	22.2
15	22	30
16	16	24.8
16	17	26.8
16	24	37
17	17	30
17	24	42
18	18	36
18	19	38
18	26	51
19	19	42
19	20	45
19	28	61
20	20	49
20	30	73
21	21	56
21	30	80
22	22	64
22	24	72
22	34	100
23	23	74
23	34	112
24	24	84
24	26	92
24	36	126
25	25	95
25	36	137
25	40	154
26	26	107
26	28	117
26	40	164
28	28	133
28	44	210
30	30	163
30	48	262
32	32	199
32	52	328
34	34	239
34	55	387
36	36	283
36	58	457
38	38	333
38	62	552
40	40	389
40	65	630
42	42	450
42	70	750
45	45	553
45	65	799
48	48	670
48	75	1050
50	50	759
50	75	1140
52	52	853
52	90	1480
54	54	956
54	80	1420
56	56	1070
56	90	1720
58	100	2040
60	60	1310
60	90	1970
62	62	1450
62	80	1870
64	64	1590
64	100	2480
68	68	1900
68	110	3070
70	70	2080
70	110	3270
75	75	2560
75	115	3930
80	80	3110
80	120	4670

5.3 Tolerances

5.3.1 The tolerances on diameter shall be as given in Table 2. Following parameters are covered in Table 2:

a) Deviation from circular form, Δ_{Rw}
b) Variation of roller gauge lot diameter, V_{DwL}
c) Variation of mean roller diameter, V_{Dwmp}, and
d) Surface roughness of the roller outside diameter surface, R_a.

5.3.2 The tolerances on the length of the cylindrical roller shall be as given in Table 3.

Table 2 Permissible Deviations of Nominal Diameter

(*Clause* 5.3.1 *and* 10.1)

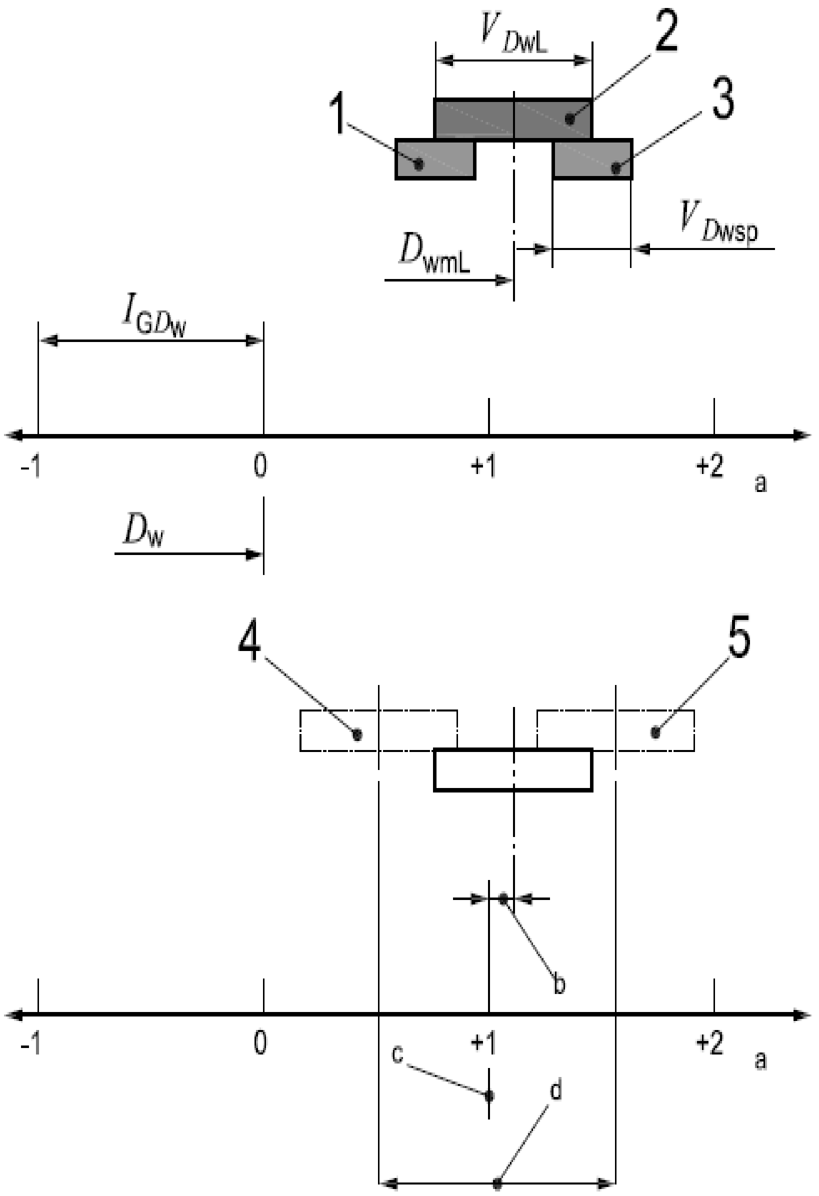
Grade	**Nominal Diameter D_W** mm		Δ_{Rw}[1], *Max*	V_{DwL}[1], *Max*	V_{Dwmp}[1], [4], *Max*	**Interval of Roller Gauge Diameter I_{GDw}**	**Gauge Range and Gauge Division Mean Deviations**[1]			**Roughness R_a of the Lateral Surface,** *Max*
	Over	Up to	µm	µm	µm	µm	µm			µm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			(9)
GN[2]	-	15	1	2	0.8	1	-8 to -1	0	+1 to +6	0.12
	15	26	1	2	0.8	1	-8 to -1	0	+1 to +6	0.16
	26	40	1.2	3	1.2	1.5	-9 to -1.5	0	+1.5 to +6	0.2
	40	75	2	(3)	2	1	-16 to -1	0	+1 to +16	0.32
	75	120	2.5	(5)	2.5	1.5	-18 to -1.5	0	+1.5 to +18	0.32
G1[3]	-	15	0.5	1.5	0.5	1	-8 to -1	0	+1 to +6	0.08
	15	26	0.5	1.5	0.5	1	-8 to -1	0	+1 to +6	0.12
	26	40	0.8	2	1.2	1.5	-9 to -1.5	0	+1.5 to +6	0.16
	40	75	1.2	(3)	1.5	1	-16 to -1	0	+1 to +16	0.25

[1] The values apply to the cylindrical part of the roller outside diameter surface.

[2] Not given in the designation.

[3] For D_W up to 26 mm the division in to gauges may also be with the half gauge interval values I_{GDw}.

[4] The values apply to two single planes which are arranged symmetrically to the middle of the roller



All dimensions in micrometers

Key:

1	smallest roller in the roller diameter lot
2	roller diameter lot
3	largest roller in the roller diameter lot
4	roller diameter lot with smallest D_{wmL} to be related to roller diameter gauge
5	roller diameter lot with largest D_{wmL} to be related to roller diameter gauge
a	roller diameter gauge scale
b	deviation of D_{wmL} from roller diameter gauge
c	roller diameter gauge.
d	range if mean diameter of roller diameter gauge lot.

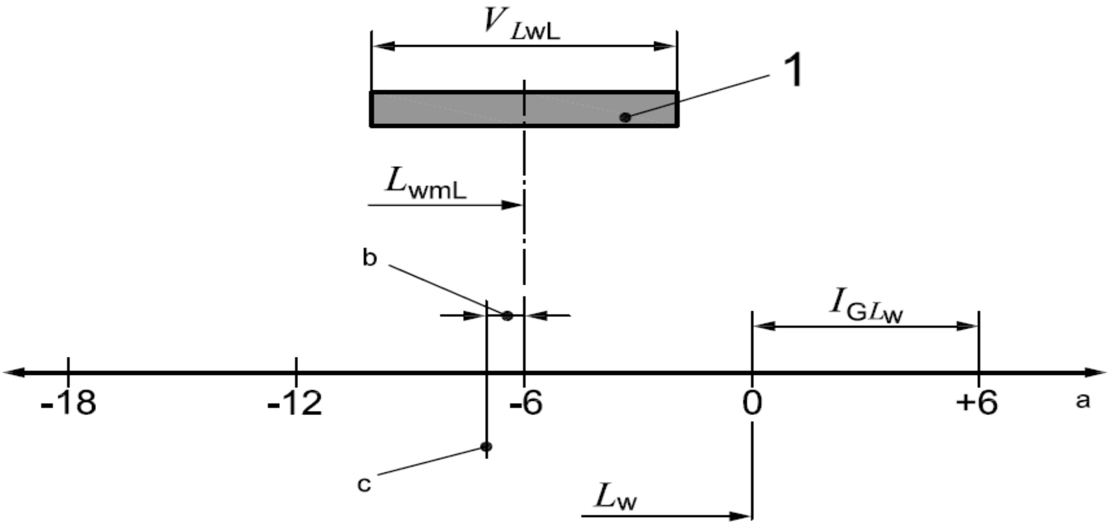
NOTE — This figure shows an example of the relationship between a roller diameter lot and its diameter gauge with a roller diameter gauge of +1 µm.

FIG. 2 ROLLER DIAMETER GAUGES AND SORTING PRINCIPLES

Table 3 Permissible Deviations of Nominal Length

(*Clause* 5.3.2)

Nominal Length (*Lw*) mm		**Variation of Roller Length Gauge Lot Length (V_{LwL})** µm	**Interval of Roller Gauge Length (I_{GLw})** µm	**Roller Length Gauge** µm
Over	up to	*Max*		
-	48	+8	6	-18; -12; -6; 0; +6
48	-	+12	10	-40; -30; -20; -10; 0; +10



All dimensions in micrometers

Key :

1	roller length lot
a	roller length gauge scale
b	deviation of L_{wmL} from roller length gauge
c	roller length gauge

NOTE — This figure shows an example of a roller length lot and its length gauge of -6 µm

FIG. 3 ROLLER LENGTH GAUGE AND SORTING PRINCIPLES

5.4 Edge Spacing

5.4.1 The limits of edge distances shall be as given in Table 4.

5.4.2 r_{1s} *(radial)* :

Distance in a single axial plane, between the imaginary sharp corner of a roller and the intersection of a chamfer surface and the roller end face.

5.4.3 r_{2s} *(axial)* :

Distance in a single axial plane, between the imaginary sharp corner of a roller and the intersection of a chamfer surface and the roller outside diameter surface.

6 MATERIAL

The material for the cylindrical rollers shall be in accordance with IS 4398 or IS 17111.

7 HARDNESS

The hardness of cylindrical rollers shall be 58 to 67 HRC or 653 to 900 HV when determined in accordance with IS 1586 (Part 1) or IS 1501 (Part 1) as applicable.

In the case of large cylindrical rollers the core hardness may drop slightly as compared with the values measured in the edge areas.

Table 4 Limits of Edge Distances

(*Clause* 5.4.1)

All dimensions in millimeters

Sl No.	D_w		r_{1s}, *Min*	r_{1s}, *Max*	r_{2s}, *Min*	r_{2s}, *Max*
	above	To				
i)	—	4	0.2	0.4	0.2	0.7
ii)	4	8	0.2	0.6	0.2	0.7
iii)	8	12	0.3	0.7	0.3	1.0
iv)	12	16	0.4	0.8	0.4	1.2
v)	16	20	0.4	1.0	0.4	1.2
vi)	20	26	0.5	1.1	0.5	1.3
vii)	26	34	0.6	1.4	0.6	1.4
viii)	34	42	0.7	1.7	0.7	1.7
ix)	42	56	0.9	2.1	0.9	2.1
x)	56	64	1.2	2.4	1.2	2.4
xi)	64	75	1.4	2.6	1.4	2.6
xii)	75	95	1.8	3.2	1.8	3.2
xiii)	95	115	2.2	3.8	2.2	3.8
xiv)	115	120	2.7	4.3	2.7	4.3

8 DESIGNATION

A cylindrical roller having nominal diameter D_w = 5 mm, nominal length L_w = 8 mm and the grade GN shall be designated as:

Cylindrical Roller IS 9202 — 5 × 8

The same cylindrical roller with improved grade G1 shall be designated as:

Cylindrical Roller IS 9202 — 5 × 8 G1

9 MANUFACTURE

To reduce edge stresses, the rollers shall be manufactured without any concavity on the cylindrical surfaces. The rollers shall be free from cracks, flaws, rust and other injurious defects.

10 FINISH

10.1 The surface roughness value for lateral surface R_a shall be as given in Table 2 when determined in accordance with IS 3073.

10.2 The surface roughness value for end face R_a shall be as given in Table 5 when determined in accordance with IS 3073.

10.3 The axial runout S_{Dw} with respect to the roller axis shall be as given in Table 5. (*See also* Fig. 4 and Fig. 5).

Table 5 Surface Roughness of Endface and Axial Runout

(*Clause* 10.2 *and* 10.3)

Sl No.	D_w mm		Axial Runout S_{Dw} µm	Surface Roughness of Endface R_a µm
i)	Above	To	*Max*	*Max*
ii)	—	26	6	0.3
iii)	26	48	6	0.5
iv)	48	120	10	0.5

11 SAMPLING AND TESTING

11.1 Sampling

Unless and otherwise agreed between the manufacturer and the purchaser, the sampling procedure as given in IS 2500 (Part 1) shall be followed for inspection.

For dimension single sampling plan with inspection level III and Acceptance Quality Level (AQL) 2.5 percent given in Table 1 and Table 2 of IS 2500 (Part 1), shall be followed.

11.3 Testing

Testing shall be as mutually agreed to between the manufacturer and the purchaser.

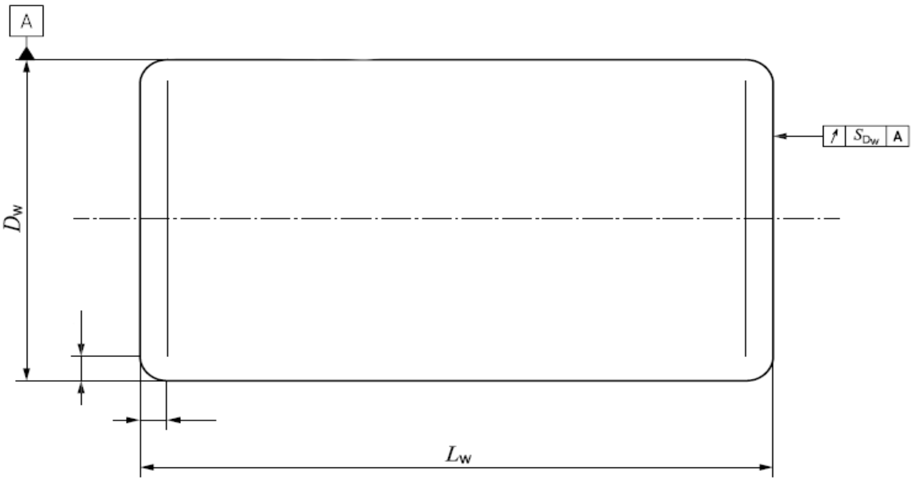


FIG. 4 AXIAL RUNOUT

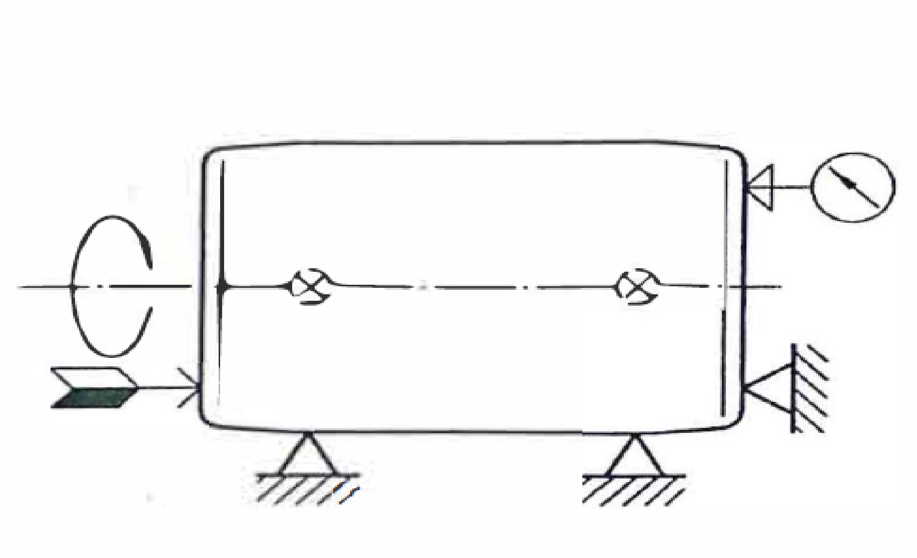


FIG. 5 MEASURING PRINCIPLE FOR AXIAL RUNOUT

12 PRESERVATION, PACKING AND MARKING

12.1 The cylindrical rollers shall be protected from rust by the application of suitable anti corrosive oil or grease and packed suitably.

12.2 Each gauge of cylindrical rollers shall be packed separately.

12.3 Packed containers shall be marked with manufacturer's name or trade-mark (if any), designation of the cylindrical rollers, date of manufacture or code indicating the date of manufacture and quantity.

12.4 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Bearings Sectional Committee, PGD 13

Organization	*Representative(s)*
Centre for Engineering and Technology (CET), SAIL Ranchi	Shri Virendra Kumar (***Chairman***)
Bajaj auto Ltd Akurdi, Pune	Shri D. D. Pawar Shri S. D. Gupta (*Alternate*)
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Bimetal Bearing Limited, Coimbatore	Shri R. S. Mani Shri Raveendra (*Alternate*)
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Defence Metallurgical Research Laboratory, Bengaluru	Shri Satyapal Singh Dr Manish Roy (*Alternate*)
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Shri Kundan Giri
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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402
Website: www.bis.gov.in

Regional Offices:

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Central	: Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
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